

25

**SYSTEMS AND METHODS FOR
MANUFACTURING REINFORCED,
THREE-ZONE MICROPOROUS
MEMBRANE**

30

35

40

45

50

ABSTRACT OF THE DISCLOSURE

Systems and methods for the manufacture of reinforced, three-zone, microporous phase inversion membrane having any one of a plurality of different possible pore sizes in any of the three zones from at least a single mother dope batch is disclosed. The systems and methods include formulating at least a single mother batch of dope in a vessel preferably maximizing the non-solvent to solvent ratio for a given weight percentage of polymer for use in a microporous phase inversion membrane production operation to produce three-zone phase inversion membranes having one of a plurality of different predetermined pore sizes in any or all of the three zones. The at least one mother dope batch is controllably formulated in at least one vessel such that the temperature of the dope does not exceed a predetermined maximum mixing temperature and is maintained at a relatively low temperature (lower than the mixing temperature) suitable for storage. A small portion of the dope from the at least one mother batch is then heated to a temperature no higher than any one of a plurality of target temperatures, in at least one thermal manipulation apparatus, the target temperature corresponding to a specific desired pore size to be formed in at least one zone of the microporous phase inversion membrane that results from operations at a dope processing site. The dope is then cooled to about room temperature or the temperature which results in a suitable and/or optimal coating viscosity. At least one dope application apparatus is connected to the at least one thermal manipulation apparatus such that any one of a plurality of different pore size producing dopes from the thermal manipulation apparatus is transported to the dope processing site and applied to any one of the three-zones of the three-zone reinforced, microporous membrane being produced.